(A) The sales fraction of a base level; by

(B) The 5-cycle city CO_2 emissions for the respective base level.

(4) The procedure specified in paragraph (b)(3) of this section is repeated in an analogous manner to determine the highway and combined fuel economy and CO_2 emission values for the model type.

(5) For alcohol dual fuel automobiles and natural gas dual fuel automobiles the procedures of paragraphs (b)(1) through (4) of this section shall be used to calculate two separate sets of city and highway fuel economy and CO_2 emission values for each model type.

(i) Calculate the city and highway fuel economy and CO_2 emission values from the tests performed using gasoline or diesel test fuel.

(ii) Calculate the city, highway, and combined fuel economy and CO_2 emission values from the tests performed using alcohol or natural gas test fuel, if 5-cycle testing was performed on the alcohol or natural gas test fuel. Otherwise, the procedure in §600.210–12(a)(3) or (b)(3) applies.

[76 FR 39553, July 6, 2011]

§600.210–12 Calculation of fuel economy and CO_2 emission values for labeling.

(a) *General labels.* Except as specified in paragraphs (d) and (e) of this section, fuel economy and CO_2 emissions for general labels may be determined by one of two methods. The first is based on vehicle-specific model-type 5-cycle data as determined in §600.209–12(b). This method is available for all vehicles and is required for vehicles that do not qualify for the second method as described in §600.115 (other than electric vehicles). The second method, the derived 5-cycle method, determines fuel economy and CO_2 emissions values from the FTP and HFET tests using equations that are derived from vehicle-specific 5-cycle model type data, as determined in paragraph (a)(2) of this section. Manufacturers may voluntarily lower fuel economy values and raise CO_2 values if they determine that the label values from any method are not representative of the fuel economy and CO_2 emissions for that model type. MPG values may not be lowered without also making a corresponding change to the CO_2 value for a model type.

(1) *Vehicle-specific 5-cycle labels.* The city and highway model type fuel economy determined in §600.209–12(b), rounded to the nearest mpg, and the city and highway model type CO_2 emissions determined in §600.209–12(b), rounded to the nearest gram per mile, comprise the fuel economy and CO_2 emission values for general fuel economy labels, or, alternatively;

(2) *Derived 5-cycle labels.* Derived 5-cycle city and highway label values are determined according to the following method:

(i)(A) For each model type, determine the derived five-cycle city fuel economy using the following equation and coefficients determined by the Administrator:

$$\text{Derived 5-cycle City Fuel Economy} = \frac{1}{\left(\{\text{City Intercept}\} + \frac{\{\text{City Slope}\}}{\text{MT FTP FE}}\right)}$$

Where:

City Intercept = Intercept determined by the Administrator based on historic vehicle-specific 5-cycle city fuel economy data.

City Slope = Slope determined by the Administrator based on historic vehicle-specific 5-cycle city fuel economy data.

MT FTP FE = the model type FTP-based city fuel economy determined under §600.208–12(b), rounded to the nearest 0.0001 mpg.

(B) For each model type, determine the derived five-cycle city CO_2 emissions using the following equation and coefficients determined by the Administrator:

Derived 5−cycle City CO_2 = ({City Intercept} × A) + ({City Slope} × MT FTP CO_2)

Where:

A = 8,887 for gasoline-fueled vehicles, 10,180 for diesel-fueled vehicles, or an appropriate value specified by the Administrator for other fuels.

City Intercept = Intercept determined by the Administrator based on historic vehicle-specific 5-cycle city fuel economy data.

City Slope = Slope determined by the Administrator based on historic vehicle-specific 5-cycle city fuel economy data.

MT FTP CO_2 = the model type FTP-based city CO_2 emissions determined under §600.208–12(b), rounded to the nearest 0.1 grams per mile.

(ii)(A) For each model type, determine the derived five-cycle highway fuel economy using the equation below and coefficients determined by the Administrator:

$$\text{Derived 5-cycle Highway Fuel Economy} = \frac{1}{\left(\{\text{Highway Intercept}\} + \frac{\{\text{Highway Slope}\}}{\text{MT HFET FE}}\right)}$$

Where:

Highway Intercept = Intercept determined by the Administrator based on historic vehicle-specific 5-cycle highway fuel economy data.

Highway Slope = Slope determined by the Administrator based on historic vehicle-specific 5-cycle highway fuel economy data.

MT HFET FE = the model type highway fuel economy determined under §600.208–12(b), rounded to the nearest 0.0001 mpg.

(B) For each model type, determine the derived five-cycle highway CO_2 emissions using the equation below and coefficients determined by the Administrator:

Derived 5-cycle Highway CO_2 = ({Highway Intercept} × A) + ({Highway Slope} × MT HFET CO_2)

Where:

A = 8,887 for gasoline-fueled vehicles, 10,180 for diesel-fueled vehicles, or an appropriate value specified by the Administrator for other fuels.

Highway Intercept = Intercept determined by the Administrator based on historic vehicle-specific 5-cycle highway fuel economy data.

Highway Slope = Slope determined by the Administrator based on historic vehicle-specific 5-cycle highway fuel economy data.

MT HFET CO_2 = the model type highway CO_2 emissions determined under §600.208–12(b), rounded to the nearest 0.1 grams per mile.

(iii) Unless and until superseded by written guidance from the Administrator, the following intercepts and slopes shall be used in the equations in paragraphs (a)(2)(i) and (ii) of this section:

City Intercept = 0.003259.

City Slope = 1.1805.

Highway Intercept = 0.001376.

Highway Slope = 1.3466.

(iv) The Administrator will periodically update the slopes and intercepts through guidance and will determine the model year that the new coefficients must take effect. The Administrator will issue guidance no later than six months prior to the earliest starting date of the effective model year (e.g., for 2011 models, the earliest start of the model year is January 2, 2010, so guidance would be issued by July 1, 2009.) Until otherwise instructed by written guidance from the Administrator, manufacturers must use the coefficients that are currently in effect.

(3) *General alternate fuel economy and CO_2 emissions label values for dual fuel vehicles.*

(i)(A) City and Highway fuel economy label values for dual fuel alcohol-based and natural gas vehicles when using the alternate fuel are separately determined by the following calculation:

$$Derived\ FE_{alt} = FE_{alt} \times \frac{5cycle_{gas}}{FE_{gas}}$$

Where:

FE_{alt} = The unrounded FTP-based model-type city or HFET-based model-type highway fuel economy from the alternate fuel, as determined in §600.208–12(b)(5)(ii).

5cycle FE_{gas} = The unrounded vehicle-specific or derived 5-cycle model-type city or highway fuel economy, as determined in paragraph (a)(1) or (2) of this section.

FE_{gas} = The unrounded FTP-based city or HFET-based model type highway fuel economy from gasoline (or diesel), as determined in § 600.208–12(b)(5)(i).

The result, rounded to the nearest whole number, is the alternate fuel label value for dual fuel vehicles.

(B) City and Highway CO_2 label values for dual fuel alcohol-based and natural gas vehicles when using the alternate fuel are separately determined by the following calculation:

$$Derived\ CO2_{alt} = CO2_{alt} \times \frac{5cycle\ CO2_{gas}}{CO2_{gas}}$$

Where:

$CO2_{alt}$ = The unrounded FTP-based model-type city or HFET-based model-type CO_2 emissions value from the alternate fuel, as determined in § 600.208–12(b)(5)(ii).

5cycle $CO2_{gas}$ = The unrounded vehicle-specific or derived 5-cycle model-type city or highway CO_2 emissions value, as determined in paragraph (a)(1) or (2) of this section.

$CO2_{gas}$ = The unrounded FTP-based city or HFET-based model type highway CO_2 emissions value from gasoline (or diesel), as determined in § 600.208–12(b)(5)(i).

The result, rounded to the nearest whole number, is the alternate fuel CO_2 emissions label value for dual fuel vehicles.

(ii) Optionally, if complete 5-cycle testing has been performed using the alternate fuel, the manufacturer may choose to use the alternate fuel label city or highway fuel economy and CO_2 emission values determined in § 600.209–12(b)(5)(ii), rounded to the nearest whole number.

(4) *General alternate fuel economy and CO_2 emissions label values for electric vehicles.* Determine FTP-based city and HFET-based highway fuel economy label values for electric vehicles as described in § 600.116. Convert W-hour/mile results to miles per kW-hr and miles per gasoline gallon equivalent. CO_2 label information is based on tailpipe emissions only, so CO_2 emissions from electric vehicles are assumed to be zero.

(5) *General alternate fuel economy and CO_2 emissions label values for fuel cell vehicles.* Determine FTP-based city and HFET-based highway fuel economy label values for fuel cell vehicles using procedures specified by the Administrator. Convert kilograms of hydrogen/mile results to miles per kilogram of hydrogen and miles per gasoline gallon equivalent. CO_2 label information is based on tailpipe emissions only, so CO_2 emissions from fuel cell vehicles are assumed to be zero.

(b) *Specific labels.* Except as specified in paragraphs (d) and (e) of this section, fuel economy and CO_2 emissions for specific labels may be determined by one of two methods. The first is based on vehicle-specific configuration 5-cycle data as determined in § 600.207. This method is available for all vehicles and is required for vehicles that do not qualify for the second method as described in § 600.115 (other than electric vehicles). The second method, the derived 5-cycle method, determines fuel economy and CO_2 emissions values from the FTP and HFET tests using equations that are derived from vehicle-specific 5-cycle configuration data, as determined in paragraph (b)(2) of this section. Manufacturers may voluntarily lower fuel economy values and raise CO_2 values if they determine that the label values from either method are not representative of the fuel economy or CO_2 emissions for that model type.

(1) *Vehicle-specific 5-cycle labels.* The city and highway configuration fuel economy determined in § 600.207, rounded to the nearest mpg, and the city and highway configuration CO_2 emissions determined in § 600.207, rounded to the nearest gram per mile, comprise the fuel economy and CO_2 emission values for specific fuel economy labels, or, alternatively;

(2) *Derived 5-cycle labels.* Specific city and highway label values from derived

5-cycle are determined according to the following method:

(i)(A) Determine the derived five-cycle city fuel economy of the configuration using the equation below and coefficients determined by the Administrator:

$$\text{Derived 5-cycle City Fuel Economy} = \frac{1}{\left(\{\text{City Intercept}\} + \frac{\{\text{City Slope}\}}{\text{Config FTP FE}}\right)}$$

Where:

City Intercept = Intercept determined by the Administrator based on historic vehicle-specific 5-cycle city fuel economy data.

City Slope = Slope determined by the Administrator based on historic vehicle-specific 5-cycle city fuel economy data.

Config FTP FE = the configuration FTP-based city fuel economy determined under §600.206, rounded to the nearest 0.0001 mpg.

(B) Determine the derived five-cycle city CO_2 emissions of the configuration using the equation below and coefficients determined by the Administrator:

Derived 5-cycle City CO_2 = {City Intercept} + {City Slope} × Config FTP CO_2

Where:

City Intercept = Intercept determined by the Administrator based on historic vehicle-specific 5-cycle city fuel economy data.

City Slope = Slope determined by the Administrator based on historic vehicle-specific 5-cycle city fuel economy data.

Config FTP CO_2 = the configuration FTP-based city CO_2 emissions determined under §600.206, rounded to the nearest 0.1 grams per mile.

(ii)(A) Determine the derived five-cycle highway fuel economy of the configuration using the equation below and coefficients determined by the Administrator:

$$\text{Derived 5-cycle Highway Fuel Economy} = \frac{1}{\left(\{\text{Highway Intercept}\} + \frac{\{\text{Highway Slope}\}}{\text{Config HFET FE}}\right)}$$

Where:

Highway Intercept = Intercept determined by the Administrator based on historic vehicle-specific 5-cycle highway fuel economy data.

Highway Slope = Slope determined by the Administrator based on historic vehicle-specific 5-cycle highway fuel economy data.

Config HFET FE = the configuration highway fuel economy determined under §600.206, rounded to the nearest tenth.

(B) Determine the derived five-cycle highway CO_2 emissions of the configuration using the equation below and coefficients determined by the Administrator:

Derived 5-cycle city Highway CO_2 = {Highway Intercept} + {Highway Slope} × Config HFET CO_2

Where:

Highway Intercept = Intercept determined by the Administrator based on historic vehicle-specific 5-cycle highway fuel economy data.

Highway Slope = Slope determined by the Administrator based on historic vehicle-specific 5-cycle highway fuel economy data.

Config HFET CO_2 = the configuration highway fuel economy determined under §600.206, rounded to the nearest tenth.

(iii) The slopes and intercepts of paragraph (a)(2)(iii) of this section apply.

(3) *Specific alternate fuel economy and CO_2 emissions label values for dual fuel vehicles.* (i)(A) Specific city and highway fuel economy label values for dual

fuel alcohol-based and natural gas vehicles when using the alternate fuel are separately determined by the following calculation:

$$\text{Derived FE}_{alt} = \text{FE}_{alt} \times \frac{\text{5 cycle}_{gas}}{\text{FE}_{gas}}$$

Where:

FE_{alt} = The unrounded FTP-based configuration city or HFET-based configuration highway fuel economy from the alternate fuel, as determined in § 600.206.

5cycle FE_{gas} = The unrounded vehicle-specific or derived 5-cycle configuration city or highway fuel economy as determined in paragraph (b)(1) or (2) of this section.

FE_{gas} = The unrounded FTP-based city or HFET-based configuration highway fuel economy from gasoline, as determined in § 600.206.

The result, rounded to the nearest whole number, is the alternate fuel label value for dual fuel vehicles.

(B) Specific city and highway CO_2 emission label values for dual fuel alcohol-based and natural gas vehicles when using the alternate fuel are separately determined by the following calculation:

$$Derived\ CO2_{alt} = CO2_{alt} \times \frac{5cycle\ CO2_{gas}}{CO2_{gas}}$$

$$\text{Derived FE}_{alt} = \text{FE}_{alt} \times \frac{\text{5 cycle}_{gas}}{\text{FE}_{gas}}$$

Where:

$CO2_{alt}$ = The unrounded FTP-based configuration city or HFET-based configuration highway CO_2 emissions value from the alternate fuel, as determined in § 600.206.

5cycle $CO2_{gas}$ = The unrounded vehicle-specific or derived 5-cycle configuration city or highway CO_2 emissions value as determined in paragraph (b)(1) or (b)(2) of this section.

$CO2_{gas}$ = The unrounded FTP-based city or HFET-based configuration highway CO_2 emissions value from gasoline, as determined in § 600.206.

The result, rounded to the nearest whole number, is the alternate fuel CO_2 emissions label value for dual fuel vehicles.

(ii) Optionally, if complete 5-cycle testing has been performed using the alternate fuel, the manufacturer may choose to use the alternate fuel label city or highway fuel economy and CO_2 emission values determined in § 600.207–12(a)(4)(ii), rounded to the nearest whole number.

(4) *Specific alternate fuel economy and CO_2 emissions label values for electric vehicles.* Determine FTP-based city and HFET-based highway fuel economy label values for electric vehicles as described in § 600.116. Determine these values by running the appropriate repeat test cycles. Convert W-hour/mile results to miles per kW-hr and miles per gasoline gallon equivalent. CO_2 label information is based on tailpipe emissions only, so CO_2 emissions from electric vehicles are assumed to be zero.

(5) *Specific alternate fuel economy and CO_2 emissions label values for fuel cell vehicles.* Determine FTP-based city and HFET-based highway fuel economy label values for fuel cell vehicles using procedures specified by the Administrator. Convert kilograms of hydrogen/mile results to miles per kilogram of hydrogen and miles per gasoline gallon equivalent. CO_2 label information is based on tailpipe emissions only, so CO_2 emissions from fuel cell vehicles are assumed to be zero.

(c) *Calculating combined fuel economy.* (1) For the purposes of calculating the combined fuel economy for a model type, to be used in displaying on the label and for determining annual fuel costs under subpart D of this part, the manufacturer shall use one of the following procedures:

(i) For gasoline-fueled, diesel-fueled, alcohol-fueled, and natural gas-fueled

automobiles, and for dual fuel automobiles that can operate on gasoline or diesel fuel, harmonically average the unrounded city and highway fuel economy values, determined in paragraphs (a)(1) or (2) of this section and (b)(1) or (2) of this section, weighted 0.55 and 0.45 respectively. Round the result to the nearest whole mpg. (An example of this calculation procedure appears in Appendix II of this part).

(ii) For alcohol dual fuel and natural gas dual fuel automobiles operated on the alternate fuel, harmonically average the unrounded city and highway values from the tests performed using the alternative fuel as determined in paragraphs (a)(3) and (b)(3) of this section, weighted 0.55 and 0.45 respectively. Round the result to the nearest whole mpg.

(iii) For electric vehicles, calculate the combined fuel economy, in miles per kW-hr and miles per gasoline gallon equivalent, by harmonically averaging the unrounded city and highway values, weighted 0.55 and 0.45 respectively. Round miles per kW-hr to the nearest 0.001 and round miles per gasoline gallon equivalent to the nearest whole number.

(iv) For plug-in hybrid electric vehicles, calculate a combined fuel economy value, in miles per gasoline gallon equivalent as follows:

(A) Determine city and highway fuel economy values for vehicle operation after the battery has been fully discharged (''gas only operation'' or ''charge-sustaining mode'') as described in paragraphs (a) and (b) of this section.

(B) Determine city and highway fuel economy values for vehicle operation starting with a full battery charge (''all-electric operation'' or ''gas plus electric operation'', as appropriate, or ''charge-depleting mode'') as described in § 600.116. For battery energy, convert W-hour/mile results to miles per gasoline gallon equivalent or miles per diesel gallon equivalent, as applicable. Note that you must also express battery-based fuel economy values in miles per kW-hr for calculating annual fuel cost as described in § 600.311.

(C) Calculate a composite city fuel economy value and a composite highway fuel economy value by combining the separate results for battery and engine operation using the procedures described in § 600.116). Apply the derived 5-cycle adjustment to these composite values. Use these values to calculate the vehicle's combined fuel economy as described in paragraph (c)(1)(i) of this section.

(v) For fuel cell vehicles, calculate the combined fuel economy, in miles per kilogram and miles per gasoline gallon equivalent, by harmonically averaging the unrounded city and highway values, weighted 0.55 and 0.45 respectively. Round miles per kilogram to the nearest whole number and round miles per gasoline gallon equivalent to the nearest whole number.

(2) For the purposes of calculating the combined CO_2 emissions value for a model type, to be used in displaying on the label under subpart D of this part, the manufacturer shall:

(i) For gasoline-fueled, diesel-fueled, alcohol-fueled, and natural gas-fueled automobiles, and for dual fuel automobiles that can operate on gasoline or diesel fuel, arithmetically average the unrounded city and highway values, determined in paragraphs (a)(1) or (2) of this section and (b)(1) or (2) of this section, weighted 0.55 and 0.45 respectively, and round to the nearest whole gram per mile; or

(ii) For alcohol dual fuel and natural gas dual fuel automobiles operated on the alternate fuel, arithmetically average the unrounded city and highway CO_2 emission values from the tests performed using the alternative fuel as determined in paragraphs (a)(3) and (b)(3) of this section, weighted 0.55 and 0.45 respectively, and round to the nearest whole gram per mile.

(iii) CO_2 label information is based on tailpipe emissions only, so CO_2 emissions from electric vehicles and fuel cell vehicles are assumed to be zero.

(iv) For plug-in hybrid electric vehicles, calculate combined CO_2 emissions as follows:

(A) Determine city and highway CO_2 emission rates for vehicle operation after the battery has been fully discharged (''gas only operation'' or ''charge-sustaining mode'') as described in paragraphs (a) and (b) of this section.

(B) Determine city and highway CO_2 emission rates for vehicle operation starting with a full battery charge (''all-electric operation'' or ''gas plus electric operation'', as appropriate, or ''charge-depleting mode'') as described in § 600.116. Note that CO_2 label information is based on tailpipe emissions only, so CO_2 emissions from electricity are assumed to be zero.

(C) Calculate a composite city CO_2 emission rate and a composite highway CO_2 emission rate by combining the separate results for battery and engine operation using the procedures described in § 600.116. Use these values to calculate the vehicle's combined fuel economy as described in paragraph (c)(1)(i) of this section.

(d) *Calculating combined fuel economy and CO_2 emissions.* (1) If the criteria in § 600.115–11(a) are met for a model type, both the city and highway fuel economy and CO_2 emissions values must be determined using the vehicle-specific 5-cycle method. If the criteria in § 600.115–11(b) are met for a model type, the city fuel economy and CO_2 emissions values may be determined using either method, but the highway fuel economy and CO_2 emissions values must be determined using the vehicle-specific 5-cycle method (or modified 5-cycle method as allowed under § 600.114–12(b)(2)).

(2) If the criteria in § 600.115 are not met for a model type, the city and highway fuel economy and CO_2 emission label values must be determined by using the same method, either the derived 5-cycle or vehicle-specific 5-cycle.

(3) Manufacturers may use any of the following methods for determining 5-cycle values for fuel economy and CO_2 emissions for electric vehicles:

(i) Generate 5-cycle data as described in paragraph (a)(1) of this section.

(ii) Multiply 2-cycle fuel economy values by 0.7 and divide 2-cycle CO_2 emission values by 0.7.

(iii) Manufacturers may ask the Administrator to approve adjustment factors for deriving 5-cycle fuel economy results from 2-cycle test data based on operating data from their in-use vehicles. Such data should be collected from multiple vehicles with different drivers over a range of representative driving routes and conditions. The Administrator may approve such an adjustment factor for any of the manufacturer's vehicle models that are properly represented by the collected data.

(e) *Fuel economy values and other information for advanced technology vehicles.* (1) The Administrator may prescribe an alternative method of determining the city and highway model type fuel economy and CO_2 emission values for general, unique or specific fuel economy labels other than those set forth in this subpart C for advanced technology vehicles including, but not limited to fuel cell vehicles, hybrid electric vehicles using hydraulic energy storage, and vehicles equipped with hydrogen internal combustion engines.

(2) For advanced technology vehicles, the Administrator may prescribe special methods for determining information other than fuel economy that is required to be displayed on fuel economy labels as specified in § 600.302–12(e).

(f) *Sample calculations.* An example of the calculation required in this subpart is in Appendix III of this part.

[76 FR 39554, July 6, 2011, as amended at 76 FR 57380, Sept. 15, 2011; 77 FR 63183, Oct. 15, 2012]

Subpart D—Fuel Economy Labeling

SOURCE: 41 FR 49761, Nov. 10, 1976, unless otherwise noted.

§ 600.301 Labeling requirements.

(a) Prior to being offered for sale, each manufacturer shall affix or cause to be affixed and each dealer shall maintain or cause to be maintained on each automobile:

(1) A general fuel economy label (initial, or updated as required in § 600.314) as described in § 600.302 or:

(2) A specific label, for those automobiles manufactured or imported before the date that occurs 15 days after general labels have been determined by the manufacturer, as described in § 600.210–08(b) or § 600.210–12(b).

(i) If the manufacturer elects to use a specific label within a model type (as defined in § 600.002, he shall also affix